

Remarks/Arguments

Applicants have received and carefully reviewed the Final Office Action of the Examiner mailed September 24, 2007, as well as the Advisory Action mailed December 21, 2007. By this Amendment, claims 29-34, 36, 37, 39-56, and 58-66 remain pending, with claims 61-66 being newly presented. No new matter has been added. Favorable reconsideration is respectfully requested.

Claim Rejections – 35 USC § 102

Claims 29, 30, 33, 34, and 36-48 were rejected under 35 USC §102(b) as anticipated by Pratt et al. (US Patent 6,127,058), hereinafter Pratt. After careful review, Applicant must respectfully disagree.

Turning first to claim 29, which now recites:

29. (Currently Amended) A method of forming a fuel cell, comprising the steps of:

- providing a first electrode layer having a first surface and a second opposing surface, wherein at least a portion of the first surface is conductive;
- forming a first aperture defined by a first aperture surface through a the first electrode layer;
- providing a second electrode layer having a first surface and a second opposing surface, wherein at least a portion of the first surface is conductive;
- forming a second aperture defined by a second aperture surface through a the second electrode layer;
- providing a proton exchange membrane having a first surface and a second opposing surface;
- providing an adhesive between the first electrode layer and the proton exchange membrane and between the second electrode layer and the proton exchange membrane;
- ~~providing a conductive layer on the first electrode layer and/or a conductive layer on the second electrode layer, wherein the conductive layer on the first electrode layer covers at least part of the first aperture surface; and~~
- sandwiching the proton exchange membrane and the adhesive between the first electrode layer and the second electrode layer with the first and second apertures substantially free of the adhesive, where the first aperture of the first electrode layer is at least partially aligned with the second aperture of the second electrode layer, thereby exposing the proton exchange membrane, wherein the second surface of the first electrode layer is proximate the first surface of the proton exchange membrane and the first surface of the second electrode layer is proximate the second surface of the proton exchange membrane;

providing an electrical connection between at least a portion of the first surface that is conductive of the first electrode layer and the proton exchange membrane; and
providing an electrical connection between at least a portion of the first surface that is conductive of the second electrode layer and the proton exchange membrane.

Pratt does not appear to teach, disclose or suggest such a method. For example, nowhere does Pratt appear to teach, disclose or suggest: providing a first electrode layer having a first surface and a second opposing surface, wherein at least a portion of the first surface is conductive; forming a first aperture defined by a first aperture surface through the first electrode layer; sandwiching the proton exchange membrane and the adhesive between the first electrode layer and the second electrode layer, wherein the second surface of the first electrode layer is proximate the first surface of the proton exchange membrane and the first surface of the second electrode layer is proximate the second surface of the proton exchange membrane; and providing an electrical connection between at least a portion of the first surface that is conductive of the first electrode layer and the proton exchange membrane.

Instead, Pratt appears to disclose, in the embodiment of Figure 4 cited by the Examiner, current collectors 45 on a second side (side adjacent the solid electrolyte sheet) of a first polymeric film 44 and on a first side (again, adjacent the solid electrolyte sheet) of a second polymeric film. Neither of the current collectors is in electrical contact with the side of the respective polymeric films that opposes (e.g. faces away from) the solid electrolyte sheet.

In the Advisory Action, the Examiner has suggested that the claim does not require that the entire aperture surface be electrically conductive. Applicants agree and note that while, for example, the conductive path between the conductive portion of the first surface of the first electrode layer and the proton exchange membrane may be established by a conductive coating covering part or all of an aperture surface of an aperture in the first electrode layer; it may also be established by a separate through connection or other means. No equivalent configuration appears to be taught by Pratt.

Moreover, nowhere does Pratt appear to teach, sandwiching the proton exchange membrane and the adhesive between the first electrode layer and the second electrode layer, where the first aperture of the first electrode layer is at least partially *aligned* with the second aperture of the second electrode layer, thereby *exposing the proton exchange membrane*

(Emphasis added.) Pratt appears to be silent with regard to the alignment of apertures within his current collectors. Pratt does disclose, in for example claim 1, “a membrane electrode assembly, comprising one solid electrolyte sheet having a plurality of anodes disposed on only one major side and a plurality of corresponding cathodes disposed on only an opposing major side”, and also in the embodiment of Figure 4 cited by the Examiner, that the Membrane Electrode Assembly (MEA) 23, unidentified in Figure 4 but discussed with regard to Figure 2, appears to be covered on one surface by anodes 27 and on the other surface by cathodes 28 in those regions where the Polymer Electrolyte Membrane (PEM) might have been exposed through apertures in the current collectors 45. That is, it appears that the MEA of Pratt is covered by anodes and cathodes in those regions where it might otherwise have been exposed through aligned apertures in the current collectors of Pratt. For these and other reasons, claim 29 is believed to be clearly patentable over Pratt et al. For similar and other reasons, claims 30-34, 36, 37, and 39-47, which depend from claim 29 and include significant additional elements, are also believed to be clearly patentable over Pratt et al.

Turning now to claim 47, which recites:

47. (Currently Amended) A fuel cell comprising:
a first electrode comprising:
a first electrode top surface;
a first electrode bottom surface;
a first electrode thickness defined by a first distance between the first electrode top surface and the first electrode bottom surface;
a first electrode aperture through the first electrode thickness defined by a first electrode aperture surface;
a second electrode comprising:
a second electrode top surface;
a second electrode bottom surface;
a second electrode thickness defined by a second distance between the second electrode top surface and the second electrode bottom surface;
a second electrode aperture through the second electrode thickness defined by a second electrode aperture surface;
a first conductive layer ~~disposed on~~ including at least a portion of the first electrode top surface, at least a portion of the first electrode bottom surface, and one or more of at least a portion of the first electrode aperture surface and a through contact, wherein the first conductive layer on the one or more of the at least a portion of the first electrode aperture surface and the through contact provides an electrical connection between the first conductive layer on the first electrode top surface and the first conductive layer on the first electrode bottom surface;

a second conductive layer disposed on including at least a portion of the second electrode top surface; ~~at least a portion of the second electrode bottom surface; and at least a portion of the second electrode aperture surface;~~
a proton exchange membrane in electrical contact with and disposed between the first conductive layer and the second conductive layer;
wherein, the first electrode aperture is at least partially aligned with the second electrode aperture, thereby exposing the proton exchange membrane.

For reasons similar to those discussed above with respect to claim 29, claim 47 is believed to be clearly patentable over Pratt et al. For similar and other reasons, claim 48, which depends from claim 47 and includes significant additional elements, is also believed to be clearly patentable over Pratt et al.

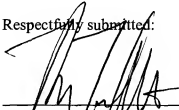
Claim Rejections – 35 USC § 103

Claims 54-56 and 58-60 were rejected under 35 U.S.C. 103(a) as being unpatentable over Pratt et al. (U.S. Patent No. 6,127,058). After careful review, Applicant must respectfully traverse this rejection. The Examiner acknowledges that Pratt fails “to teach that (sic) a conductive feed-through through the first material” and that “the contacts are only on one side of the non-conduction portion of the current collector. The Examiner then asserts, without any objective reason or motivation, that it would have been obvious to modify Pratt by “extend[ing] the contacts (46) through the non-conduction portion (44).” However, were the contacts (46) of Pratt moved from the inner surface to the outer surface of the non-conductive polymer layer (44) by the proposed rearrangement, they would not be capable of providing the interconnects (26) of Figure 3 because of the two intervening non-conductive layers of polymer (44). Without the required interconnects (26) between the individual cells, the collective fuel cell of Pratt would fail to function for its intended purpose. It is well settled that a proposed modification cannot render the prior art unsatisfactory for its intended purpose (see, MPEP 2143.01, V). Also, a proposed modification cannot change the principle of operation of a reference (see, MPEP 2143.01, VI). For these and other reasons, claim 54 is believed to be clearly patentable over Pratt et al. For similar and other reasons, claims 55, 56, and 58-60, which depend from claim 54 and include significant additional elements, are also believed to be clearly patentable over Pratt et al.

Finally, newly presented claims 61-66 are believed to be in condition for allowance.

In view of the foregoing, all pending claims are believed to be in a condition for allowance. Reexamination and reconsideration are respectfully requested. Issuance of a Notice of Allowance in due course is anticipated. If a telephone conference might be of assistance, please contact the undersigned attorney at (612) 359-9348.

Respectfully submitted:



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